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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09/620,523 | 07/20/2000 | Bruce E. Novich | 1596C5 | 2899 |

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| EXAMINER |
|---|
| GRAY, JILL M |

| ART UNIT | PAPER NUMBER |
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| 1794 | |

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| 01/11/2008 | PAPER |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 09/620,523 | NOVICH ET AL. | |
| | Examiner | Art Unit | |
| | Jill M. Gray | 1794 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *31 October 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1,4,6-40 and 43-58* is/are pending in the application.

4a) Of the above claim(s) *4,6-11,21-39 and 48-58* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,12-20,40 and 43-47* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

### *Continued Examination Under 37 CFR 1.114*

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on October 31, 2007 has been entered.

### *Claim Rejections - 35 USC § 103*

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

3. Claims 1, 12-20, 40, and 43-47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Japanese Patent Publication translation 4-307787 (Iketani) in view of Japanese Patent Publication translation 1-249333 (Nagamine), further in view of PCT Publication WO 93/24314 (Papageorge), for reasons of record.

Iketani teaches a method for manufacturing a printed circuit substrate by inserting a glass cloth prepeg impregnated with a thermosetting resin varnish. See abstract. In addition Iketani teaches that the prepeg is obtained by impregnating the fiber substrate with a varnish containing a filler and then impregnating with a varnish containing no filler, per claims 1 and 40. The substrate can be glass cloths and nonwoven glass fabrics and the fillers can be inorganic non-polymeric fillers. The filler has a particle size within the instant claimed range, per claims 15 and 44. See [0006].

Also, the thermosetting varnish can be an epoxy resin, polyamide resin or a phenolic resin, wherein the preferred resin is an epoxy resin. See [0007]. Accordingly, Iketani teaches that the glass cloth is impregnated with a "resin compatible coating" which is compatible with the matrix material, and that said "resin compatible coating" comprises a plurality of particles, as required by claims 1 and 40. While Iketani teaches that glass cloths can be used he is silent as to the glass cloth being non-degreased and the specific particles as now claimed.

Papageorge teaches printed circuit boards comprising a laminate formed by impregnating a resin, such as epoxy into a glass cloth substrate wherein the base resin has highly thermally conductive particles incorporated therein, wherein said particles can be a nitride, carbide or graphite. See pages 4-5 and Examples. At the time the invention was made, the skilled artisan would have been reasonably motivated to modify the teachings of Iketani by using as the filler material a nitride, carbide or graphite, as taught by Papageorge in order to produce a laminate with high thermal conductivity, by incorporating filler material of high thermoconductivity, low coefficient of thermal expansion and sufficient hardness. Accordingly, the substitution of one known filler material in the production of reinforced laminates for another (known filler material) would have yielded predictable results to one of ordinary skill in the art at the time of the invention.

Nagamine is as set forth previously and teaches a laminate adapted for an electronic support wherein the laminate comprises a glass cloth impregnated with a resin such as epoxy. Nagamine teaches that the glass yarns that his glass cloth is

formed from can be sized with various known sizing agents which can be used in accordance with the purpose of the glass cloth. Nagamine also discloses that a non-desizing sizing agent, which does not require degreasing or surface treatment is known in the art, said non-desizing sizing agent eliminating the necessity of twisting, degreasing, and surface treatment and thereby significantly improving productivity and production yield.

As set forth above, Iketani teaches circuit board substrate comprising a glass cloth prepeg impregnated with a thermosetting varnish containing a filler and a varnish without a filler. Iketani is silent as to whether the glass cloth is non-degreased. Also as set forth above, Nagamine teaches that non-desized glass cloths are known in the art and provide efficacious economic properties such as improved productivity and production yield. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use as the glass cloth substrate any glass cloth substrates known in the art as being suitable for impregnation of epoxy resins when producing substrates for circuit boards such as a non-desized glass cloth as taught by Nagamine, motivated by the reasonable expectation of success of making a prepeg for a circuit board substrate and improving productivity and production yield. In addition, all of the claimed elements were known in the art, namely, sized glass cloths and non-desized glass cloths, both of which are taught to be useful in the production of laminates for electronic supports. The substitution of one known element (sized glass cloth) for another known in the art, (non-desized glass cloth) would have yielded predictable results to one of ordinary skill in the art at the time the invention was made.

As to claim 13, Papageorge teaches that the particles can be nitrides, carbides or graphite, which are the same type of particles contemplated by applicants. Accordingly, it is the position of the examiner that the particles of the prior art have a Moh's hardness value which does not exceed the Moh's hardness value of glass fiber.

As to claims 14 and 43, Iketani teaches that the particles have a particle size within applicants' claimed range. Accordingly, it is the examiner's position that the teachings of Iketani would have provided direction to the skilled artisan for particles of the instant claimed size and thereby obviating the requirement of a particle size sufficient to allow strand wet out.

As to claims 16-17, 19-20, and 45-46, Iketani is silent as to the specific composition of the resin compatible coating; however, Iketani does teach that epoxy with fillers can be the thermosetting impregnating varnish. Nagamine teaches an epoxy resin for a use in as an impregnating varnish for glass cloth in the formation of circuit boards, said epoxy resin comprising at least one film-forming material, a resin reactive diluent comprising functional groups of the type contemplated by applicants. Note page 17. At the time of the invention thereof, it would have been obvious to the skilled artisan, to impregnate a glass cloth substrate with an epoxy resin composition containing particulate filler, as taught by Iketani, wherein the specific filler material and epoxy resin composition are selected from among those known in the art, such as those filler materials taught by Papageorge and the epoxy resin composition taught by Nagamine and as set forth by applicants, motivated by the ability to produce laminates

for electronic supports that have good dimensional stability, dielectric properties and heat resistance.

Regarding claim 12, Papageorge teaches filler material that is the same type contemplated by applicants, such as graphite, nitrides and carbides. Accordingly, the examiner has reason to believe that filler material of Papageorge have a thermal conductivity within the instant claimed range, in the absence of factual evidence to the contrary.

Regarding claims 18 and 47, the reinforced laminate of the prior art is substantially similar to that of applicants. Accordingly, it is the position of the examiner that properties such as LOI and air permeability are the same as well, in the absence of factual evidence to the contrary.

Therefore, the combined teachings of Iketani, Nagamine and Papageorge would have rendered obvious the invention as claimed in present claims 1, 12-20, 40, and 43-47.

4. Claims 1, 12-13, 16-20, 40, and 45-47 are rejected under 35 U.S.C. 103(a) as being unpatentable over PCT Publication WO 93/24314 (Papageorge) in view of Japanese Patent Publication translation 1-249333 (Nagamine), for reasons of record.

Papageorge is as set forth above but is silent as to the glass cloth being non-degreased.

Nagamine is as set forth previously and teaches a laminate adapted for an electronic support wherein the laminate comprises a glass cloth impregnated with a resin such as epoxy. Nagamine teaches that the glass yarns that his glass cloth is

formed from can be sized with various known sizing agents, which can be used in accordance with the purpose of the glass cloth. Nagamine also discloses that a non-desizing sizing agent, which does not require degreasing or surface treatment is known in the art, said non-desizing sizing agent eliminating the necessity of twisting, degreasing, and surface treatment and thereby significantly improving productivity and production yield.

As set forth above, Papageorge teaches laminates for circuit board comprising a glass cloth prepeg impregnated with a thermosetting resin containing a filler. Papageorge is silent as to whether the glass cloth is non-degreased. Also as set forth above, Nagamine teaches that non-desized glass cloths are known in the art and provide efficacious economic properties such as improved productivity and production yield. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use as the glass cloth substrate any glass cloth substrates known in the art as being suitable for impregnation of epoxy resins when producing substrates for circuit boards such as a non-desized glass cloth as taught by Nagamine, motivated by the reasonable expectation of success of making a laminate for a circuit board substrate and improving productivity and production yield. In addition, all of the claimed elements were known in the art, namely, sized glass cloths and non-desized glass cloths, both of which are taught to be useful in the production of laminates for electronic supports. The substitution of one known element (glass cloth) for another known in the art, (non-desized glass cloth) would have yielded predictable results to one of ordinary skill in the art at the time the invention was made.

Regarding claim 12, Papageorge teaches filler material that is the same type contemplated by applicants, such as graphite, nitrides and carbides. Accordingly, the examiner has reason to believe that the filler material of Papageorge has a thermal conductivity within the instant claimed range, in the absence of factual evidence to the contrary.

As to claim 13, Papageorge teaches that the particles can be nitrides, carbides or graphite, which are the same type of particles contemplated by applicants. Accordingly, it is the position of the examiner that the particles of the prior art have a Moh's hardness value which does not exceed the Moh's hardness value of glass fiber.

As to claims 16-17, 19-20, and 45-46, Papageorge is silent as to the specific composition of the resin compatible coating; however, Papageorge does teach that epoxy with fillers can be the thermosetting impregnating resin. Nagamine teaches an epoxy resin for a use in as an impregnating varnish for glass cloth in the formation of circuit boards, said epoxy resin comprising at least one film-forming material, a resin reactive diluent comprising functional groups of the type contemplated by applicants. Note page 17. At the time of the invention thereof, it would have been obvious to the skilled artisan, to impregnate a glass cloth substrate with an epoxy resin composition containing particulate filler, as taught by Papageorge, wherein the specific filler material and epoxy resin composition are selected from among those known in the art, such as those filler materials taught by Papageorge and the epoxy resin composition taught by Nagamine and as set forth by applicants, motivated by the ability to produce laminates

for electronic supports that have good dimensional stability, dielectric properties and heat resistance.

Regarding claims 18 and 47, the reinforced laminate of the prior art is substantially similar to that of applicants. Accordingly, it is the position of the examiner that properties such as LOI and air permeability are the same as well, in the absence of factual evidence to the contrary.

Therefore, the combined teachings of Papageorge and Nagamine would have rendered obvious the invention as claimed in present claims 1, 12-13, 16-20, 40, and 45-47.

***Response to Arguments***

5. Applicant's arguments filed October 31, 2007 have been fully considered but they are not persuasive.

Applicants argue that while Papageorge teaches a base resin having dispersed particles, there is nothing in Papageorge that teaches or suggests that any portion of the glass cloth or its fibers is coated with a resin coating comprising a plurality of particles as in Applicants' claimed invention, further arguing that contrary to the Examiner's assertion, Papageorge fails to remedy the deficiencies of Iketani, and one of ordinary skill in the art would not be motivated to modify Iketani and coat a portion of the fiber substrate with a resin compatible coating comprising a plurality of particles, absent the benefit of hindsight.

The Examiner disagrees. In particular, Papageorge is relied upon for all that he would have reasonably imparted to one having ordinary skill in this art at the time the

invention was made, namely, that it is well known in this art to use highly thermally conductive particles such as nitride, carbide or graphite particles as the filler material in epoxy impregnating resins that are to be impregnated into glass cloth substrates in forming laminates for circuit boards. Also, Applicants should note that the very nature of "impregnating into a glass cloth substrate" necessarily results in the glass cloth and fibers associated therewith being coated with the impregnating resin and all filler materials incorporated in said resin. In addition, it is the Examiner's position that the test for obviousness is not whether the features of one reference can be bodily incorporated into the structure of another and proper inquiry should not be limited to the specific structure shown by the references, but should be into the concepts fairly contained therein, and the overriding question to be determined is whether those concepts would suggest to one skilled in the art the modification called for by the claims. Iketani teaches that his glass cloth is impregnated with a resin compatible coating that comprises a plurality of particles, but does not specify the specific type of particles. Papageorge through his teachings further identifies specific types of particles that one of ordinary skill in this art would have been reasonably motivated to use as the particles of Iketani that would have yielded predictable results. In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the

applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

Applicants argue that as discussed in Section II.A., Papageorge and Nagamine fail to teach or suggest all the claim limitations and that the Examiner has failed to establish that independent claims 1 and 40 and the claims depending therefrom are *prima facie* obvious based on Papageorge and Nag amine.

In response thereto, the Examiner's position is as set forth above and incorporated herein.

No claims are allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jill M. Gray whose telephone number is 571-272-1524. The examiner can normally be reached on M-Th and alternate Fridays 8:00-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Milton I. Cano can be reached on 571-272-1398. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Jill M. Gray
Primary Examiner
Art Unit 1794

jmg